WHAT IS CLAIMED:

1. A method of producing a tissue-engineered vascular vessel comprising:

providing a vessel-forming fibrin mixture comprising fibrinogen, thrombin, and cells suitable for forming a vascular vessel;

molding the vessel-forming fibrin mixture into a fibrin gel having a tubular shape; and

incubating the fibrin gel having a tubular shape in a medium suitable for growth of the cells under conditions effective to produce a tissue-engineered vascular vessel.

2. The method according to claim 1, wherein the cells suitable for forming a vascular vessel are vascular smooth muscle cells.

3. The method according to claim 1, wherein the cells suitable for forming a vascular vessel are fibroblasts.

4. The method according to claim 1, wherein the cells suitable for forming a vascular vessel are in a concentration within the vessel-forming fibrin mixture of about 1 to 4 x 10^6 cells/ml.

5. The method according to claim 1 further comprising:

controlling degradation rate of the vessel by addition of a protease inhibitor to the vessel-forming fibrin mixture.

6. The method according to claim 5, wherein the protease inhibitor is aprotinin.

7. The method according to claim 5, wherein the protease inhibitor is epsilonaminocaproic acid.

8. The method according to claim 1, wherein said molding is carried out in a tube with an inner mandrel.

9. The method according to claim 8, wherein the vessel has an interior surface, said method further comprising:

seeding endothelial cells on the interior surface of the vessel.

10. The method according to claim 1 further comprising:

subjecting the fibrin gel having a tubular shape to a pulse after said molding.

11. The method according to claim 1, wherein the medium suitable for growth comprises a growth additive.

12. The method according to claim 11, wherein the growth additive comprises a growth hormone selected from the group consisting of VEGF, b-FGF, PDGF, and KGF.

13. The method according to claim 1 further comprising:

changing the medium suitable for growth.

14. The method according to claim 1, wherein the vessel has an outer surface to which cells are added during said molding.

15. The method according to claim 14, wherein the cells to be added to the outer surface of the vessel are fibroblasts.

16. The method according to claim 14, wherein the cells to be added to the outer surface of the vessel are specific organ cells.

17. The method according to claim 1, wherein the fibrin gel is combined with a porous scaffold to enhance vascular grafting.

18. The method according to claim 17, wherein the porous scaffold is decellularized elastin.

19. The method according to claim 17, wherein the porous scaffold is poly lactic-glycolic acid.

20. A tissue-engineered vascular vessel produced by the method of claim 1.

21. A tissue-engineered vascular vessel comprising:

a gelled fibrin mixture comprising fibrinogen, thrombin, and cells, wherein the gelled fibrin mixture has a tubular shape.

22. The tissue-engineered vascular vessel according to claim 21, wherein the cells are vascular smooth muscle cells.

23. The tissue-engineered vascular vessel according to claim 21, wherein the cells are fibroblasts.

24. The tissue-engineered vascular vessel according to claim 21, wherein the cells are in a concentration in the gelled fibrin mixture of about 1 to 4 x 10^6 cells/ml.

25. The tissue-engineered vascular vessel according to claim 21, wherein the gelled fibrin mixture further comprises a protease inhibitor.

26. The tissue-engineered vascular vessel according to claim 25, wherein the protease inhibitor is aprotinin.

27. The tissue-engineered vascular vessel according to claim 25, wherein the protease inhibitor is epsilonaminocaproic acid.

28. The tissue-engineered vascular vessel according to claim 21, wherein the vessel has an interior surface on which endothelial cells are present.

29. The tissue-engineered vascular vessel according to claim 21, wherein the vessel has an outer surface on which cells are present.

30. The tissue-engineered vascular vessel according to claim 29, wherein the cells present on the outer surface of the vessel are fibroblasts.

31. The tissue-engineered vascular vessel according to claim 29, wherein the cells present on the outer surface of the vessel are specific organ cells.

32. The tissue-engineered vascular vessel according to claim 21, wherein the gelled fibrin mixture contains a porous scaffold.

33. The tissue-engineered vascular vessel according to claim 32, wherein the porous scaffold is decellularized elastin.

34. The tissue-engineered vascular vessel according to claim 32, wherein the porous scaffold is poly lactic-glycolic acid.

35. A method of producing a tissue-engineered vascular vessel for a particular patient comprising:

providing a vessel-forming fibrin mixture comprising fibrinogen, thrombin, and cells suitable for forming a vascular vessel, at least one of which is autologous to the patient;

molding the vessel-forming fibrin mixture into a fibrin gel having a tubular shape;

incubating the fibrin gel having a tubular shape in a medium suitable for growth of the cells under conditions effective to produce a tissue-engineered vascular vessel for a particular patient; and

implanting the tissue-engineered vascular vessel into the particular patient.

36. The method according to claim 35, wherein the fibrinogen is autologous.

37. The method according to claim 35, wherein the cells suitable for forming a vascular vessel are vascular smooth muscle cells.

38. The method according to claim 35, wherein the cells suitable for forming a vascular vessel are fibroblasts.

39. The method according to claim 35, wherein the cells suitable for forming a vascular vessel are present in the vessel-forming fibrin mixture in a concentration of about 1 to 4 x 10^6 cells/ml.

40. The method according to claim 35, wherein the cells suitable for forming a vascular vessel are autologous.

41. The method according to claim 35 further comprising:

controlling degradation rate of the vessel by addition of a protease inhibitor to the vessel-forming fibrin mixture.

42. The method according to claim 41, wherein the protease inhibitor is aprotinin.

43. The method according to claim 41, wherein the protease inhibitor is epsilonaminocaproic acid.

44. The method according to claim 35, wherein said molding is carried out in a tube with an inner mandrel.

45. The method according to claim 44, wherein the vessel has an interior surface, said method further comprising:

seeding endothelial cells on the interior surface of the vessel.

46. The method according to claim 35 further comprising:

subjecting the fibrin gel having a tubular shape to a pulse after said molding.

47. The method according to claim 35, wherein the medium suitable for growth comprises a growth additive.

48. The method according to claim 47, wherein the growth additive comprises a growth hormone selected from the group consisting of VEGF, b-FGF, PDGF, and KGF.

49. The method according to claim 35 further comprising:

changing the medium suitable for growth.

50. The method according to claim 35, wherein the vessel has an outer surface to which cells are added during said molding.

51. The method according to claim 50, wherein the cells to be added to the outer surface of the vessel are fibroblasts.

52. The method according to claim 50, wherein the cells to be added to the outer surface of the vessel are specific organ cells.

53. The method according to claim 35, wherein the fibrin gel is combined with a porous scaffold to enhance said implanting.

54. The method according to claim 53, wherein the porous scaffold is decellularized elastin.

55. The method according to claim 53, wherein the porous scaffold is poly lactic-glycolic acid.

56. A tissue-engineered vascular vessel produced by the method of claim 35.